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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/646,157	08/22/2003	Rajiv Singh	5853-388	9591

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EXAMINER
WEBB, GREGORY E

ART UNIT	PAPER NUMBER
1751	

DATE MAILED: 09/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

T.D

Office Action Summary	Application No.	Applicant(s)	
	10/646,157	SINGH, RAJIV	
	Examiner	Art Unit	
	Gregory E. Webb	1751	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 July 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) *12-20* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 12/15/2003 Signed
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

PD

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 1-11 are rejected under 35 U.S.C. 102(e) as being anticipated by Tsuchiya (US6530968).

Concerning the chemical mechanical polishing and the polishing slurry, Tsuchiya teaches the following:

A chemical mechanical polishing slurry of this invention (hereinafter,

referred to as a "polishing slurry") may be suitably used in polishing a metal film formed on an insulating film with a concave on a substrate by CMP.(see col. 3, lines 20-25)

Concerning the halogen ion, bromine ion and the chlorine ion, Tsuchiya teaches the following:

Cationic surfactants include amine salts containing a salt-forming primary, secondary or tertiary amine and their modified salts; onium compounds such as quaternary ammonium, phosphonium and sulfonium salts; circular nitrogen-containing compounds and heterocyclic compounds such as pyridinium, quinolinium and imidazolinium salts; for example, lauryl-trimethyl-ammonium chloride, cetyl-trimethyl-ammonium chloride (CTAC), cetyl-trimethyl-ammonium bromide (CTAB), cetyl-dimethyl-benzyl-ammonium bromide, cetylpyridinium chloride, dodecylpyridinium chloride, alkyl-dimethyl-chlorobenzyl-ammonium chloride and alkyl-naphthalene-pyridinium chloride.(see col. 5, lines 25-36)

Concerning the iodine ion, Tsuchiya teaches the following:

Examples of an antioxidant include benzotriazole, 1,2,4-triazole, benzofuroxane, 2,1,3-benzothiazole, o-phenylenediamine, m-phenylenediamine, cathechol, o-aminophenol, 2-mercaptobenzothiazole, 2-mercaptobenzimidazole, 2-mercaptobenzoxazole, melamine and their derivatives. Among these, benzotriazole and its derivatives are preferable. Examples of a benzotriazole derivative include substituted benzotriazoles having a benzene ring substituted with hydroxy; alkoxy such

as methoxy and ethoxy; amino; nitro; alkyl such as methyl, ethyl and butyl; halogen such as fluorine, chlorine, bromine and iodine. Examples of a 1,2,4-triazole derivative include a substituted 1,2,4-triazole having any of the substituents as described above in its 5-membered ring.(see col. 6, lines 50-62)

Concerning the specific abrasive, Tsuchiya teaches the following:

Examples of a polishing material which may be used in this invention include alumina such as .alpha.-alumina and .theta.-alumina; silica such as fumed silica and colloidal silica; titania; zirconia; germania; ceria; and a combination of two or more selected from these metal oxide polishing grains. Among these, alumina or silica is preferable although when a mixture of polishing materials is used, it is preferable to blend those in which a charge on a grain surface has the same sign.(see cols. 3-4)

Concerning the additional surfactant, Tsuchiya teaches the following:

Thickeners were POE (10) nonyl phenyl ether (an nonionic surfactant), lauryl-trimethyl-ammonium chloride (a cationic surfactant) and hydroxyethylcellulose (a water-soluble polymer) for Examples 1, 2 and 3, respectively.(see col. 9, lines 13-17)

Concerning the polymer additive, Tsuchiya teaches the following:

Anionic water-soluble polymers which may be used include polycarboxylate water-soluble polymers; for example, polyacrylate water-soluble polymers such as polyacrylic acid and its salts and acrylic acid-(meth)acrylate copolymers and their salts; alginates; and cellulose derivatives such as

carboxymethylcellulose. Nonionic water-soluble polymers which may be used include cellulose derivatives such as hydroxyethylcellulose; polyvinyl alcohol; polyvinylpyrrolidone; polyethylene glycol; and polyacrylamide.(see col. 5, lines 49-59)

Concerning the salt, Tsuchiya teaches the following:

Examples of an anionic surfactant which may be used include soluble salts such as sulfonates, sulfates, carboxylates, phosphates and phosphonates, which may be an alkali metal, alkaline-earth metal, ammonium or amine salts, preferably an ammonium salt; for example, alkylsulfates such as alkylbenzenesulfonates and dodecylsulfates; aliphatic acid salts such as stearates; polycarboxylates; alkylphosphates and hexametaphosphates. (see col. 5, lines 17-24)

Claims 1-11 are rejected under 35 U.S.C. 102(e) as being anticipated by Grumbine (US6830503).

Concerning the chemical mechanical polishing, Grumbine teaches the following:

Catalyst/oxidizer-based CMP system for organic polymer films(see title)

Concerning the polishing slurry, Grumbine teaches the following:

The chemical-mechanical polishing system comprises an abrasive, a polishing pad, or both. Preferably, the CMP system comprises both an abrasive and a polishing pad. The abrasive can be any suitable abrasive. The abrasive can

be fixed on the polishing pad and/or can be in particulate form and suspended in the liquid carrier. The polishing pad can be any suitable polishing pad.(see col. 3, lines 5-11)

Concerning the halogen ion, preferred iodide, bromine ion, chlorine ion and the salt, Grumbine teaches the following:

7. The method of claim 6, wherein the metal compound is an iron compound or copper compound of formula MX, MX.sub.2, MX.sub.3, or M.sub.2 X.sub.3 where M is Fe or Cu and X is selected from the group consisting of nitrate, fluoride, chloride, bromide, iodide, sulfate, phosphate, acetate, oxalate, acetylacetonate, citrate, tartrate, malonate, gluconate, phthalate, succinate, perchlorate, perbromate, and periodate.(see claim 7)

Concerning the specific abrasive, Grumbine teaches the following:

The abrasive can be any suitable abrasive. For example, the abrasive particles can be natural or synthetic and can include diamond (e.g., polycrystalline diamond), garnet, glass, carborundum, metal oxide (e.g., silica, fumed alumina, fused alumina, ceramic alumina, chromia, and iron oxide), polymer, and the like. The abrasive also can be coated particles or polymer/metal oxide composite particles. When the abrasive is a metal oxide abrasive, it preferably is selected from the group consisting of alumina, silica, titania, ceria, zirconia, germania, magnesia, co-formed products thereof, and combinations thereof. The choice of abrasive will depend on the mechanical characteristics of the organic polymer film being

polished. For example, if the organic polymer film is particularly susceptible to scratching, softer abrasive particles (e.g., silica and polymer particles) are preferred.(see col. 3, lines 13-27)

Concerning the additional surfactant, Grumbine teaches the following:

In order to promote stabilization of the polishing composition against settling, and flocculation, a variety of optional additives, such as surfactants or dispersing agents, can be used. If a surfactant is added to the CMP slurry, then it can be an anionic, cationic, nonionic, or amphoteric surfactant, or a combination of two or more surfactants can be employed. Furthermore, it has been found that the addition of a surfactant may be useful to improve the within-wafer-non-uniformity (WIWNU of wafers polished with the CMP system, thereby improving the surface of the wafer and reducing wafer defects.(see col. 5, lines 15-25)

Claims 1-11 are rejected under 35 U.S.C. 102(b) as being anticipated by Wake (US6436811).

Concerning the chemical mechanical polishing and the polishing slurry, Wake teaches the following:

FIG. 4 shows variation of an in-plane uniformity (k value) plotted to a polishing pressure when CMP was conducted using a polishing slurry with or without citric acid. It can be seen from the figure that CMP using a polishing slurry with citric acid (.smallcircle.) gave a smaller k value,

i.e., polishing with better in-plane uniformity at the same polishing pressure, compared with CMP using a polishing slurry without citric acid (.quadrature.). It may be because a polishing product adheres to the polishing pad in CMP using a polishing slurry without citric acid while not in CMP using a polishing slurry comprising citric acid.(see fig. 4)

Concerning the halogen ion and the chlorine ion, Wake teaches the following:

An amino acid may be added as such, as a salt or as a hydrate. Examples of those which may be added include arginine, arginine hydrochloride, arginine picrate, arginine flavianate, lysine, lysine hydrochloride, lysine dihydrochloride, lysine picrate, histidine, histidine hydrochloride, histidine dihydrochloride, glutamic acid, glutamic acid hydrochloride, sodium glutaminate monohydrate, glutamine, glutathione, glycylglycine, alanine, .beta.-alanine, .gamma.-aminobutyric acid, .epsilon.-aminocarproic acid, aspartic acid, aspartic acid monohydrate, potassium aspartate, potassium aspartate trihydrate, tryptophan, threonine, glycine, cystine, cysteine, cysteine hydrochloride monohydrate, oxyproline, isoleucine, leucine, methionine, ornithine hydrochloride, phenylalanine, phenylglycine, proline, serine, tyrosine, valine, and a mixture of these amino acids.(see col. 10, lines 43-59)

Concerning the iodine ion, Wake teaches the following:

Examples of an antioxidant include benzotriazole, 1,2,4-triazole, benzofuroxan, 2,1,3-benzothiazole, o-phenylenediamine, m-phenylenediamine,

cathechol, o-aminophenol, 2-mercaptobenzothiazole, 2-mercaptobenzimidazole, 2-mercaptobenzoxazole, melamine, and their derivatives. Among these, benzotriazole and its derivatives are preferable. Examples of a benzotriazole derivative include substituted benzotriazoles having a benzene ring substituted with hydroxy; alkoxy such as methoxy and ethoxy; amino; nitro; alkyl such as methyl, ethyl and butyl; halogen such as fluorine, chlorine, bromine and iodine.

Furthermore, naphthalenetriazole and naphthalenebistriazole as well as substituted naphthalenetriazoles and substituted naphthalenebistriazoles substituted as described above may be used.(see col. 11, lines 7-20)

Concerning the bromine ion, additional surfactant and the salt, Wake teaches the following:

Examples of surfactant dispersing agents include anionic, cationic, ampholytic and nonionic surfactants. Anionic surfactants which may be used include soluble salts of sulfonic acids, sulfates, carboxylic acids, phosphates and phosphonic acids; for example, sodium alkylbenzenesulfonate (ABS), sodium dodecylsulfate (SDS), sodium stearate and sodium hexamethaphosphate. Cationic surfactants include amine salts containing a salt-forming primary, secondary or tertiary amine and their modified salts; onium compounds such as quaternary ammonium, phosphonium and sulfonium salts; circular nitrogen-containing compounds such as pyridinium, quinolinium and imidazolinium salts; and heterocyclic compounds; for example, cetyl-trimethyl-ammonium chloride (CTAC),

cetyl-trimethyl-ammonium bromide (CTAB), cetylpyridinium chloride, dodecylpyridinium chloride, alkyl-dimethylchlorobenzyl-ammonium chloride and alkyl-naphthalene-pyridinium chloride.(see col. 8, lines 12-27)

Concerning the specific abrasive, Wake teaches the following:

As long as it does not adversely affect the effects of secondary-particle containing .theta.-alumina, additional polishing grains may be used, which include aluminas such as .alpha.-alumina and .delta.-alumina other than .theta.-alumina; silicas such as fumed silica and colloidal silica; titania; zirconia; germania; ceria; and a mixtures of two or more selected from these metal oxide polishing grains.(see col. 9, lines 11-17)

Concerning the polymer additive, Wake teaches the following:

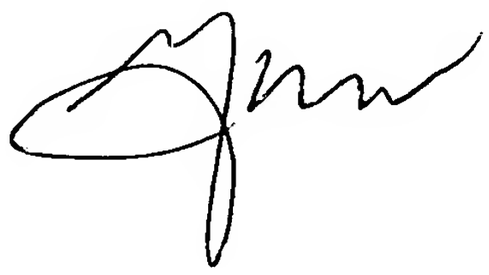
Aqueous polymer dispersing agents include ionic and nonionic polymers. Ionic polymers include alginic acid and its salts, polyacrylic acid and its salts, a polycarboxylic acid and its salts, cellulose, carboxymethylcellulose and hydroxylethylcellulose. Nonionic polymers include polyvinyl alcohol, polyvinylpyrrolidone, polyethylene glycol and polyacrylamide.(see cols. 8-9)

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregory E. Webb whose telephone number is 571-272-1325. The examiner can normally be reached on 9:00-17:30 (m-f).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yogendra Gupta can be reached on 571-272-1316. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Gregory E. Webb
Primary Examiner
Art Unit 1751

gew